IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: William S. Woods	Examiner: Corey P. Chau
Serial No.: 09/393,463	Group Art Unit: 2615
Filed: September 10, 1999	Docket: 899.009US1
For: AUDIO SIGNAL PROCESSING	

APPEAL BRIEF UNDER 37 CFR § 41.37

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Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

The Appeal Brief is presented in support of the Notice of Appeal to the Board of Patent Appeals and Interferences, filed on 15 March 2007, from the Final Rejection of claims 1-23, 25, 28-29, 34, 36 and 40 of the above-identified application, as set forth in the Final Office Action mailed on 15 November 2006.

The Commissioner of Patents and Trademarks is hereby authorized to charge Deposit Account No. 19-0743 in the amount of $500.00 which represents the requisite fee set forth in 37 C.F.R. § 41.20(b)(2). The Appellants respectfully request consideration and reversal of the Examiner's rejections of pending claims.

APPEAL BRIEF UNDER 37 C.F.R. § 41.37

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1. REAL PARTY IN INTEREST

The real party in interest of the above-captioned patent application is the assignee, STARKEY LABORATORIES, INC., doing business at 6600 Washington Ave. So., Eden Prairie, Minnesota 55344.

2. RELATED APPEALS AND INTERFERENCES

There are no other appeals or interferences known to Appellant that will have a bearing on the Board's decision in the present appeal.

3. STATUS OF THE CLAIMS

The present application was filed on 10 September 1999 with claims 1-50.

A restriction requirement was mailed on 24 March 2004. A non-final Office Action was mailed on 26 August 2004. A second non-final Office Action was mailed on 29 July 2005. A third non-final Office Action was mailed on 9 March 2006. A final Office Action was mailed on 15 November 2006. An Advisory Action was mailed on 22 February 2007. Claims 1-23 stand rejected. Claim 24 is allowed. Claim 25 stands rejected. Claims 26 and 27 are objected to. Claims 28 and 29 stand rejected. Claims 30-33 are objected to. Claim 34 stands rejected. Claims 37-39 are objected to. Claim 40 stands rejected. Claims 41-45 are allowed. Claim 46 is objected to. Claims 47-50 are allowed.

Claims 1-23, 25, 28-29, 34, 36, and 40 are the subject of the present appeal.

4. STATUS OF AMENDMENTS

No amendments have been made subsequent to the Final Office Action dated 15 November 2006.

5. SUMMARY OF CLAIMED SUBJECT MATTER

Some aspects include, but are not limited to, systems and methods for processing audio signals.

Application, Independent claim 1; Figures 1 and 2 ; page 3, lines 12-15; page 8, line 10 – page 10, line 25; page 11, line 18 – page 12, line 1.

In an embodiment as recited in independent claim 1, a method includes inhibiting at least one feedback component of an input audio signal (102) by adjusting (208) a feedback-inhibiting filter (134) using a narrowband subaudible probe signal (204).

Application, Independent claim 2; Figures 1, 2, and 5 ; page 3, lines 16-20; page 8, line 10 – page 10, line 25; page 11, line 18 – page 12, line 1; page 13, lines 21-25.

In an embodiment as recited in independent claim 2, a method includes filtering (202) a processed signal by a notch filter (108) to form a filtered signal and sending (204) a subaudible narrowband signal (p(t)) having a first bandwidth into the filtered signal to form a probe signal to probe a feedback path (130) having a second bandwidth.

Application, Independent claim 8; Figures 1, 3, and 5 ; page 3, lines 12-15; page 8, line 10 – page 10, line 25; page 12, lines 2-4; page 13, lines 21-25.

In an embodiment as recited in independent claim 8, a system includes at least one detector (106, 300) to detect undesired feedback in an input signal (102, 302), at least one notch filter (108) to filter a processed signal, where the at least one notch filter (108) provides a filtered signal and the processed signal is provided by processing the input signal (102), and at least one probe generator (110, 500) to generate a probe signal (p(t)), where the probe signal (p(t)) and the filtered signal are used to probe a feedback path (130) with a narrowband subaudible audio probe signal.

Application, Independent claim 25; Figures 1, 3, and 5 ; page 3, lines 12-15; page 8, line 10 – page 10, line 25; page 12, lines 2-4; page 13, line 21- page 14, line 27; page 14, line 28 – page 15, line 15.

In an embodiment as recited in independent claim 25, a system includes at least one detector (106, 300) to detect undesired feedback in an input signal (102, 302), at least one notch filter (108) to filter a processed signal, where the at least one notch filter (108) provides a filtered signal and the processed signal is provided by processing the input signal (102), and at least one probe generator (110, 500) to generate a probe signal (p(t)), where the probe signal (p(t)) and the filtered signal used to probe a feedback path (130) with a narrowband subaudible audio probe signal. The at least one probe generator (110, 500) is receptive to a feedback indicator parameter, where the at least one probe generator (110, 500) includes an amplitude indicator (508) to indicate an amplitude level of the probe signal, where the amplitude indicator provides an amplitude signal, a frequency indicator (522) to indicate a frequency of the probe signal, where the frequency indicator (522) provides a frequency signal, and a signal generator (524) receptive to the amplitude signal and the frequency signal to generate the probe signal.

Application, Independent claim 36; Figures 1 and 5 ; page 3, lines 12-15; page 4, lines 7-11, page 8, line 10 – page 10, line 25; page 11, line 18 – page 12, line 1.

In an embodiment as recited in independent claim 36, a method includes inhibiting at least one feedback component of an input audio signal (102) by adjusting (208) a feedback-inhibiting filter (134) using a narrowband subaudible probe signal (204). The method further includes generating a probe signal to provide the narrowband subaudible probe signal, where generating the probe signal includes generating an amplitude signal that is indicative of an amplitude level of the probe signal, generating a frequency signal that is indicative of a frequency of the probe signal, and generating a sinusoidal signal that is based on the amplitude signal and the frequency signal.

The above summary provides example embodiments with respect to the independent claims that are the subject of the instant appeal, but does not provide an exhaustive or exclusive view of the present subject matter. Appellant refers the Board to the appended claims and their legal equivalents for statements of invention in the instant application. Page numbers, line numbers, and reference symbols from the drawings are exemplary in nature. These page and line numbers and reference symbols from the drawings are not intended to be an exhaustive listing of each and every location where the particular subject matter can be found in the specification.

6. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Claim 1 was rejected under 35 USC § 102(e) as being anticipated by Kandel (US 6,353,671).

Claims 1-2, 5-15, 17-18, 20, 22, 25, 28-29, 34, 36, and 40 were rejected under 35 USC § 102(b) as being anticipated by Miller et al. (US 5,506,910).

Claims 1-7 were rejected under 35 USC § 103(a) as being unpatentable over Finn et al. (US 6,496,581).

Claims 8-23, 25, 28-29, 34, 36, and 40 were rejected under 35 USC § 103(a) as being unpatentable over Finn et al. in view of Seki et al. (US 5,677,987).

Claim 1 was rejected under 35 USC § 103(a) as being unpatentable over Stott et al. (US 2002/0044667).

7. ARGUMENT

A) The Applicable Law under 35 U.S.C. §102(a),(b), and (e)

As discussed in M.P.E.P. § 2131, a "claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). "The identical invention must be shown in as complete detail as is contained in the ... claim." *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989). In addition, "[a]nticipation requires the presence in a single prior reference disclosure of each and every element of the claimed invention, *arranged as in the claim*." *Lindemann Maschinenfabrik GmbH v. American Hoist & Derrick Co.*, 730 F.2d 1452, 221 USPQ 481, 485 (Fed. Cir. 1984) (citing *Connell v. Sears, Roebuck & Co.*, 722 F.2d 1542, 220 USPQ 193 (Fed. Cir. 1983)) (emphasis added).

Further, M.P.E.P. § 2173.01 states:

> A fundamental principle contained in 35 U.S.C. 112, second paragraph is that applicants are their own lexicographers. They can define in the claims what they regard as their invention essentially in whatever terms they choose so long as any special meaning assigned to a term is clearly set forth in the specification. See MPEP § 2111.01. Applicant may use functional language, alternative expressions, negative limitations, or any style of expression or format of claim which makes clear the boundaries of the subject matter for which protection is sought. As noted by the court in *In re Swinehart*, 439 F.2d 210, 160 USPQ 226 (CCPA 1971), a claim may not be rejected solely because of the type of language used to define the subject matter for which patent protection is sought.

B) The Applicable Law under 35 U.S.C. §103(a)

According to *M.P.E.P.* § 2141, which cites *Hodosh v. Block Drug Co., Inc.*, 786 F.2d 1136, 1143 n.5, 229 USPQ 182, 187 n.5 (Fed. Cir. 1986), the following tenets of patent law must be adhered to when applying 35 U.S.C. § 103. First, the claimed invention must be considered as a whole. Second, the references must be considered as a whole and must suggest the desirability and thus the obviousness of making the combination. Third, the references must be viewed without the benefit of impermissible hindsight vision afforded by the claimed invention. Fourth, obviousness is determined using a reasonable expectation of success standard. Under § 103, the scope and content of the prior art are to be determined; differences between the prior art

and the claims at issue are to be ascertained; and the level of ordinary skill in the pertinent art resolved. *M.P.E.P.* § 2141 (citing *Graham v. John Deere*, 383 U.S. 1, 148 USPQ 459 (1966)).

The Examiner has the burden under 35 U.S.C. § 103 to establish a *prima facie* case of obviousness. *In re Fine*, 837 F.2d 1071, 1074, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988). To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. *M.P.E.P.* § 2142 (citing *In re Vaeck*, 947 F.2d, 488, 20 USPQ2d 1438 (Fed. Cir. 1991)).

The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on Appellant's disclosure. *M.P.E.P.* § 2142 (citing *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991)). The references must expressly or impliedly suggest the claimed invention or the examiner must present a convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings of the references. *M.P.E.P.* § 2142 (citing *Ex parte Clapp*, 227 USPQ 972, 973 (Bd. Pat. App. & Inter. 1985)). In considering the disclosure of a reference, it is proper to take into account not only specific teachings of the reference but also the inferences which one skilled in the art would reasonably be expected to draw therefrom. *M.P.E.P.* § 2144.01 (citing *In re Preda*, 401 F.2d 825, 826, 159 USPQ 342, 344 (CCPA 1968)). However, if the proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification. *M.P.E.P.* § 2143.01 (citing *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984)). In determining the differences between the prior art and the claims, the question under 35 U.S.C. 103 is not whether the differences themselves would have been obvious, but whether the claimed invention as a whole would have been obvious. *Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 218 USPQ 871 (Fed. Cir. 1983); *Schenck v. Nortron Corp.*, 713 F.2d 782, 218 USPQ 698 (Fed. Cir. 1983); *Interconnect Planning Corp. v. Feil*, 774 F.2d 1132, 1143, 227 USPQ 543, 551 (Fed. Cir. 1985); MPEP § 2141.02.

Further, M.P.E.P. § 2173.01 states:

> A fundamental principle contained in 35 U.S.C. 112, second paragraph is that applicants are their own lexicographers. They can define in the claims what they regard as their invention essentially in whatever terms they choose so long as any special meaning assigned to a term is clearly set forth in the specification. See MPEP § 2111.01. Applicant may use functional language, alternative expressions, negative limitations, or any style of expression or format of claim which makes clear the boundaries of the subject matter for which protection is sought. As noted by the court in *In re Swinehart*, 439 F.2d 210, 160 USPQ 226 (CCPA 1971), a claim may not be rejected solely because of the type of language used to define the subject matter for which patent protection is sought.

M.P.E.P. § 2111.01 I, in part, recites:

> (The USPTO uses a different standard for construing claims than that used by district courts; during examination the USPTO must give claims their broadest reasonable interpretation in light of the specification.). This means that the words of the claim must be given their plain meaning unless the plain meaning is inconsistent with the specification. *In re Zletz*, 893 F.2d 319, 321, 13 USPQ2d 1320, 1322 (Fed. Cir. 1989)

, where it is also noted in M.P.E.P. § 2111.01 III:

> ("In the absence of an express intent to impart a novel meaning to the claim terms, the words are presumed to take on the ordinary and customary meanings attributed to them by those of ordinary skill in the art."). It is the use of the words in the context of the written description and customarily by those skilled in the relevant art that accurately reflects both the "ordinary" and the "customary" meaning of the terms in the claims. *Ferguson Beauregard/Logic Controls v. Mega Systems*, 350 F.3d 1327, 1338, 69 USPQ2d 1001, 1009 (Fed. Cir. 2003)

In addition, as noted in M.P.E.P. 2145. X. A., "[a]ny judgement on obviousness is in a sense necessarily a reconstruction based on hindsight reasoning, but so long as it takes into account only knowledge which was within the level of ordinary skill in the art at the time the claimed invention was made and does not include knowledge gleaned only from applicant's disclosure, such a reconstruction is proper." *In re McLaughlin* 443 F.2d 1392, 1395, 170 USPQ 209, 212 (CCPA 1971).

C) Discussion of the rejection of claim 1 under 35 U.S.C. § 102(e) as being anticipated by Kandel (US 6,353,671).

Appellant traverses this rejection of claim 1. Appellant respectfully asserts that the

rejection, as proffered in the final Office Action, fails to show that Kandel teaches each and every claim element of claim 1 and/or fails that show that Kandel teaches the identical invention in as complete detail as is contained in claim 1.

Appellant submits that, to one of ordinary skill in the art, a filter operating on a signal does not teach or suggest a signal adjusting the filter. Claim 1 recites several features. First, claim 1 recites, in part, "inhibiting at least one feedback component of an input audio signal by adjusting a feedback-inhibiting filter." Secondly, claim 1 recites, in part, "adjusting a feedback-inhibiting filter using a narrowband subaudible probe signal."

In the final Office Action, the Examiner has referenced filter of 120 of Kandel as being a feedback-inhibiting filter. As shown in Figure 4 of Kandel, Kandel's filter 120 receives a signal, filters the signal, and provides an output. Appellant cannot find a disclosure, a teaching, or a suggestion in Kandel that Kandel's filter 120 is adjusted using a signal. Appellant submits that a filter operating on a signal does not disclose, teach, or suggest that the filter is adjusted using the signal. In item 65 of the final Office Action on page 19, it is stated that

> the filter 120 of Kandel operates in a similar manner to the filter adjuster 124 and inhibiting filter 134 disclosed in the application, wherein the signal generated by the inhibiting filter 134 is subtracted from the input signal 102, which the signal from filter 120 of Kandel operated in a similar manner to be subtracted from the input 112. Therefore, Kandel meets the limitation disclosed in Claim 1.

Appellant submits that "the signal generated by the inhibiting filter 134 is subtracted from the input signal 102, which the signal from filter 120 of Kandel operated in a similar manner to be subtracted from the input 112" does not consider the feature of claim 1 that recites "adjusting a feedback-inhibiting filter using a narrowband subaudible probe signal." Support for claim 1 of the instant application may be found in the specification, for example, page 3, lines 12-15, page 8, line 10 – page 10, line 25, page 11, line 18 – page 12, line 1, and in Appellant's Figure 1, where a narrowband subaudible probe signal is used in conjunction with a filter adjuster 124 to adjust inhibiting filter 134. Appellant submits that there is no teaching or suggestion that Kandel's filter 120 is adjusted using a signal.

Further, Appellant submits that a 102(e) analysis based on a prior art reference that is structured or operates "in a similar manner" is not proper. The issue is whether taking the claim as a whole, the references teach all the elements of the claim, as claimed. From the quote above,

it appears that Kandel has been applied with respect to "inhibiting at least one feedback component of an input audio signal." However, the analysis provided in the final Office Action does not demonstrate a teaching or suggestion in Kandel regarding "adjusting a feedback-inhibiting filter using a narrowband subaudible probe signal," as recited in claim 1.

Appellant notes that Kandel discusses system equations for implementing his apparatus at column 10, line 61 – column 11, line 67. At column 11, line 39, Kandel recites "H(120) is chosen to approximate $-H_A/H_B$..." Appellant submits that these sections of Kandel demonstrate that Kandel's apparatus can be constructed using analytical system analysis techniques to meet certain design constraints that include signals to be processed. However, Appellant submits that choosing parameters to construct Kandel's filter 120 does not teach or suggest adjusting Kandel's filter 120 using a signal. Appellant cannot find in Kandel, as proffered in the final Office Action, a teaching or suggestion of a narrowband subaudible probe signal used to adjust an inhibiting filter.

Thus, Appellant submits that Kandel does not teach each and every claim element of claim 1 and that Kandel does not teach each and every claim element arranged as in claim 1. Thus, Appellant submits that Kandel does not anticipate claim 1 and that claim 1 is patentable over Kandel for at least the reasons stated above.

Appellant respectfully requests withdrawal of these rejections of claim 1, and reconsideration and allowance of this claim.

D) Discussion of the rejection of claims 1-2, 5-15, 17-18, 20, 22, 25, 28-29, 34, 36, and 40 under 35 U.S.C. § 102(b) as being anticipated by Miller et al. (US 5,506,910).

Claims 1 and 36

Appellant traverses these rejections of claims 1 and 36. Appellant respectfully asserts that the rejection, as proffered in the final Office Action, fails to show that Miller teaches each and every claim element of claim 1 and/or fails that show that Miller teaches does teach each and every claim element arranged as in each of claims 1 and 36.

Appellant submits that a filtering unit, such as a feedback eliminator, operating on a signal does not teach or suggest, to one skilled in the art, using a signal to adjust the filtering unit. Claim 1 recites several features. First, claim 1 recites, in part, "inhibiting at least one

feedback component of an input audio signal by adjusting a feedback-inhibiting filter." Secondly, claim 1 recites, in part, "adjusting a feedback-inhibiting filter using a narrowband subaudible probe signal."

Miller relates to an automatic equalizer that generates narrowband reference signals to produce a desired frequency response in an amplification system. As noted on page 21 of the Final Office Action, Miller's apparatus and method uses a feedback eliminator to eliminate unwanted acoustic feedback. However, a feed back eliminator operating on a signal does not *per se* teach or suggest a signal being used to adjust the feedback eliminator. Further on page 21 of the Final Office Action, it is stated:

> It is implicit that the narrowband reference signals generated in automatic equalizer is provided to the input of the feedback eliminator, as shown in Fig. 3, which the signals from the feedback eliminator is fed to power amplifiers in which speakers 36 broadcast the signal from power amplifiers 34. A microphone 40 to pick up the audio program, wherein the signal from the microphone is utilizes to make adjustments in the automatic equalizer. See Figs. 1 and 3; column 6, line 29 to column 7, line 20; column 11, lines 12-37.

The above quote indicates that Miller's feedback eliminator operates on a narrowband reference signal from Miller's automatic equalizer, which does not teach or suggest that Miller's feedback eliminator is adjusted using the narrowband reference signal. Further, "the microphone is utilizes to make adjustments in the automatic equalizer" does not teach or suggest adjusting Miller's feedback eliminator using the narrowband reference signal. Rather, Miller's automatic equalizer provides a signal on which Miller's feedback eliminator may operate and not a signal used to adjust Miller's feedback eliminator. Therefore, Miller does not teach or suggest adjusting a feedback-inhibiting filter using a narrowband subaudible probe signal.

Thus, Appellant submits that Miller does not teach each and every claim element of claim 1 and that Miller does not teach the identical invention in as complete detail as is contained in claim 1. Thus, Appellant submits that Miller does not anticipate claim 1 and that claim 1 is patentable over Miller for at least the reasons stated above. Claim 36 includes the features of claim 1. Therefore, Appellant submits that claim 36 is patentable over Miller for at least the reasons stated above with respect to claim 1.

Appellant respectfully requests withdrawal of these rejections of claims 1 and 36 and allowance of these claims.

Claims 2, and 5-7

Appellant traverses these rejections of claims 2 and 5-7. Appellant respectfully asserts that the rejection, as proffered in the final Office Action, fails to show that Miller teaches each and every claim element as arranged in each of claims 2 and 5-7.

The method of claim 2, in part, recites "sending a subaudible narrowband signal having a first bandwidth into the filtered signal to form a probe signal to probe a feedback path having a second bandwidth." Miller, on the hand, relates to a method to equalize gain in which a narrowband signal, that may be subaudible, is sent from a speaker 36 to a microphone 40 with the microphone 40 situated at a distance in front of the speaker 36 to provide essentially the same audio pickup as being received by an audience (See Miller Summary and column 7, lines 5-80). Miller's audio pickup 40 provides a signal to the Miller's automatic equalizer 20 by means of an electrical path. Miller generates his subaudible narrowband reference signal on a substantially direct path from speaker 36 to the microphone pick-up 40. Miller's method may be viewed as generating a probe signal to probe a substantially direct path to an audience, but the reference signal does not function as a probe of the electrical connection that feeds the signal received at the microphone 40 back to the automatic equalizer 20. Further, Appellant submits that a method that generates a reference signal to probe a substantially direct audience path from a speaker to a microphone does not teach or suggest a method that generates a subaudible narrowband probe signal to probe a feedback path.

Thus, Appellant submits that Miller does not teach each and every claim element of claim 2 and that Appellant submits that Miller does not teach each and every claim element arranged as in claim 2. Thus, Appellant submits that Miller does not anticipate claim 2 and that claim 2 is patentable over Miller for at least the reasons stated above. Claims 5-7 depend from claim 2 and, therefore, are patentable over Miller for at least the reasons stated herein.

Appellant respectfully requests withdrawal of these rejections of claims 2 and 5-7 and allowance of these claims.

Claims 8-15, 17, 18, 20, 22, 25, 28-29, and 34

Appellant traverses these rejections of claims 8-15, 17, 18, 20, 22, 25, 28-29, and 34. Appellant respectfully asserts that the rejection, as proffered in the final Office Action, fails to

show that Miller teaches each and every claim element arranged as in each of claims 8-15, 17, 18, 20, 22, 25, 28-29, and 34.

Miller's apparatus is structured to provide automatic signal equalization. Miller's apparatus generates a narrowband subaudible reference from a speaker 36 to a microphone 40 with the microphone 40 situated at a distance in front of the speaker 36 to provide an audio pickup essentially as being received by an audience (See Miller Summary and column 7, lines 5-80). Miller's audio pickup 40 provides a signal to the Miller's automatic equalizer 20 by means of an electrical path. Miller's system generates a subaudible narrowband reference signal on a substantially direct path from a speaker 36 to the microphone pick-up 40. Further, Miller's apparatus is configured to generate a reference signal to probe a substantially direct path to an audience, where the reference signals probe the path from speaker 36 to microphone 40. The result of sending Miller's reference signal collected at microphone 40 is fed back to automatic equalizer 20, but the reference signal does not function as a probe of the electrical connection that provides the automatic equalizer 20 with the signal received at the microphone 40. Therefore, Miller's system is not configured to probe a feedback path. In contrast, the system of claim 8 is configured to probe a feedback path with a narrowband subaudible probe signal. Appellant submits that an apparatus that generates a reference signal to probe a substantially direct audience path from a speaker to a microphone does not teach or suggest an apparatus that generates a subaudible narrowband probe signal to probe a feedback path.

Thus, Appellant submits that Miller does not teach each and every claim element of claim 8 and that Miller does not teach each and every claim element as arranged in claim 8. Thus, Appellant submits that Miller does not anticipate claim 8 and that claim 8 is patentable over Miller for at least the reasons stated above. Claims 9-15, 17, 18, 20, and 22 depend from claim 8 and, therefore, are patentable over Miller for at least the reasons stated herein. Claim 25 includes the features of claim 8. Therefore, Appellant submits that claim 25 is patentable over Miller for at least the reasons stated above with respect to claim 8. Claims 28, 29, and 34 depend from claim 25 and, therefore, are patentable over Miller for at least the reasons stated herein.

Appellant respectfully requests withdrawal of these rejections of claims 8-15, 17, 18, 20, 22, 25, 28-29, and 34 and allowance of these claims.

Claim 40

Appellant traverses these rejections of claim 40. Appellant respectfully asserts that the rejection, as proffered in the final Office Action, fails to show that Miller teaches each and every claim element as arranged in claim 40.

Claim 40 includes the features of claim 8. As a result, claim 40 is patentable over Miller for at least the reasons stated above with respect to claim 8. In addition, claim 40 includes additional features that are not taught or suggested in Miller. Appellant cannot find in Miller a disclosure of a filter adjuster that adjusts an inhibiting filter where the filter includes a modeler configured to model at least one response of a feedback path when the feedback path is probed with a narrowband subaudible audio probe signal. As noted above with respect to claim 8, Miller probes a direct path from speaker 36 to microphone 40, which is not a feedback path. Further, as discussed with respect to claim 1, Miller's feedback eliminator is not configured to be adjusted using Miller's generation of a subaudible narrowband reference signal. Therefore, Miller does not teach or suggest a system configured to adjust an inhibiting filter using a filter adjuster based on a response of a feedback path probed with a narrowband subaudible audio probe signal, as recited in claim 40.

Thus, Appellant submits that Miller does not teach each and every claim element of claim 40 and that Miller does not teach each and every claim element as arranged in claim 40. Thus, Appellant submits that Miller does not anticipate claim 40 and that claim 40 is patentable over Miller for at least the reasons stated above.

Appellant respectfully requests withdrawal of these rejections of claim 40 and allowance of this claim.

E) Discussion of the rejection of claims 1-7 under 35 U.S.C. § 103(a) as being unpatentable over Finn et al. (US 6,496,581).

Claim 1

Appellant traverses these rejections of claim 1. Appellant respectfully asserts that the rejection, as proffered in the final Office Action, fails to establish a proper *prima facie* case of obviousness with respect to claim 1, since Finn et al. (hereafter Finn) does not teach or suggest all the elements of each of claim 1.

Appellant cannot find in Finn, as proffered in the final Office Action, a teaching or a suggestion of a method that inhibits a feedback component of an input audio signal by adjusting a filter using a narrowband subaudible probe signal. Finn relates to apparatus and a methods for echo cancellation. In the final Office Action, it is stated that "Finn discloses . . . adjusting a feedback-inhibiting filter (Fig.8; column 15, lines 17-36) using a narrowband probe signal (400, 430)." Appellant cannot find in Finn a teaching or a suggestion that signal 406 from tone generator 400 or that signal 436 from tone generator 430 are probe signals. The cited section, column 15, lines 17-36 of Finn, notes that signal 406 provides a model input to model 402 and that signal 436 provides a model input to model 432. Finn does not teach or suggest that the signals 406, 436 from tone generators 400 and 430, respectively, provide a probing function. As a result, Finn does not teach or suggest a subaudible narrowband probe signal used to adjust an inhibiting filter as recited in claim 1. Therefore, Finn does not teach or suggest all the elements of claim 1.

Considering claim 1 as a whole and the differences between claim 1 and Finn, Appellant submits that Finn, as proffered in the Office Action, does not establish a proper *prima facie* case of obviousness with respect to claim 1, for at least the reasons discussed above. Thus, Appellant submits that claim 1 is patentable over Finn.

Appellant respectfully requests withdrawal of these rejections of claim 1 and allowance of this claim.

Claims 2-7

Appellant traverses these rejections of claims 2-7. Appellant respectfully asserts that the rejection, as proffered in the final Office Action, fails to establish a proper *prima facie* case of obviousness with respect to each of claims 2-7, since Finn does not teach or suggest all the elements of each of claims 2-7.

As discussed with respect to claim 1, Appellant submits that Finn, as proffered in the final Office Action, does not teach or suggest a subaudible narrowband probe signal. In addition, the Examiner has not shown where, in Finn, a feedback path is probed by a narrowband probe signal. In the final Office Action on page 8, the Examiner states that "Finn discloses an acoustic feedback tonal canceler is provided, removing tonal noise

from the output of the microphone to prevent broadcast thereof by a remote but acoustically coupled loudspeaker." Appellant notes that Finn discusses an apparatus and a method for canceling tonal feedback, but such apparatus and methods are distinctly different from that of claim 2 of the invention. Appellant submits that "removing tonal noise from the output of the microphone to prevent broadcast" does not teach or suggest forming a subaudible narrowband probe signal to probe a feedback path. Thus, Appellant submits that Finn does not teach or suggest all the elements of claim 2.

Considering claim 2 as a whole and the differences between claim 2 and Finn, Appellant submits that Finn, as proffered in the Office Action, does not establish a proper *prima facie* case of obviousness with respect to claim 2, for at least the reasons discussed above. Thus, Appellant submits that claim 2 is patentable over Finn. Claims 3-7 depend from claim 2 and are patentable over Finn for at least the reasons stated herein.

Appellant respectfully requests withdrawal of these rejections of claims 2-7 and allowance of these claims.

F) Discussion of the rejection of claims 8-23, 25, 28-29, 34, 36, and 40 under 35 U.S.C. § 103(a) as being unpatentable over Finn et al. (US 6,496,581) in view of Seki et al. (US 5,677,987).

Claims 8-23, 25, 28-29, and 34

Appellant traverses these rejections of claims 8-23, 25, 28-29, and 34. Appellant respectfully asserts that the rejections, as proffered in the final Office Action, fail to establish a proper *prima facie* case of obviousness with respect to claims 8-23, 25, 28-29, and 34, since Finn does not teach or suggest all the elements of each of claims 8-23, 25, 28-29, and 34.

Appellant cannot find in the combination of Finn and Seki et al. (hereafter Seki), as proffered in the final Office Action, a teaching or a suggestion of a system configured to generate a probe signal to probe a feedback path with a narrowband subaudible audio probe signal. Though the proposed combination of Finn and Seki includes multiple microphones and multiple speakers, Appellant submits that the proposed combination does not teach or suggest a system configured to generate a narrowband subaudible audio signal or to generate a narrowband

subaudible audio signal that functions as a probe signal. In the final Office Action on page 12 with respect to claim 8, it is stated that

> Finn discloses an acoustic feedback tonal canceler is provided, removing tonal noise from the output of the microphone to prevent broadcast thereof by a remote but acoustically coupled loudspeaker.
>
> . . .
>
> Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention was made to modify Finn with the teaching of Finn to incorporate an acoustic feedback tonal canceler in order to removing tonal noise from the output of the microphone to prevent broadcast thereof by a remote but acoustically coupled loudspeaker.

Appellant submits that this quote from the final Office Action appears ambiguous. Echo canceling and tonal feedback canceling in acoustically coupled systems do not teach or suggest using a system configured to generate a probe signal to probe a feedback with narrowband subaudible audio probe signal. As shown in Finn's Figure 8, the output of a speaker of a first subsystem is received by a microphone of a second subsystem such that feedback cancellation is performed in the second subsystem before a signal is sent to its microphone to couple to the first subsystem. Appellant submits that Finn is void of a discussion about sending narrowband probe signals between the two subsystems. In addition, since the feedback cancellation occurs within each subsystem of Figure 8, the use of tone generators in the feedback cancellation within each subsystem does not teach or suggest that the outputs from the speakers 32 or 34 in Figure 8 are narrowband subaudible audio signals. For at least the reasons stated above, Appellant submits that Finn in view of Seki does not teach or suggest all the elements of claim 8.

Considering claim 8 as a whole and the differences between claim 8 and Finn in view of Seki, Appellant submits that Finn in view of Seki, as proffered in the Office Action, does not establish a proper *prima facie* case of obviousness with respect to claim 8, for at least the reasons discussed above. Thus, Appellant submits that claim 8 is patentable over Finn in view of Seki. Claims 9-23, 25, 28-29, and 34 depend from claim 8 and are patentable over Finn in view of Seki for at least the reasons stated herein.

Appellant respectfully requests withdrawal of these rejections of claims 8-23, 25, 28-29, and 34 and allowance of these claims.

Claim 36

Appellant traverses these rejections of claim 36. Appellant respectfully asserts that the rejection, as proffered in the final Office Action, fails to establish a proper *prima facie* case of obviousness with respect to claim 36, since Finn in view of Seki does not teach or suggest all the elements of each of claim 36.

Claim 36 includes the features of claim 1. Therefore, Appellant submits that claim 36 is patentable over Finn for at least the reasons stated above with respect to claim 1. In the final Office Action on page 11, Seki is cited with respect to "a compressor/limiter for limiting the amplitude an input signal in order to avoid damaging equipment such as a speaker." Appellant submits that combining Seki with Finn, as proffered in the final Office Action, does not cure the deficiencies of citing Finn with respect to claim 36. Therefore, Appellant submits that claim 36 is patentable over Finn in view of Seki for at least the reasons stated herein.

Appellant respectfully requests withdrawal of these rejections of claim 36 and allowance of this claim.

Claim 40

Appellant traverses these rejections of claim 40. Appellant respectfully asserts that the rejection, as proffered in the final Office Action, fails to establish a proper *prima facie* case of obviousness with respect to claim 40, since Finn in view of Seki does not teach or suggest all the elements of claim 40.

Claim 40 includes the features of claim 8. As a result, claim 40 is patentable over Finn in view of Seki for at least the reasons stated above with respect to claim 8. In addition, claim 40 includes additional features that are not taught or suggested in Finn in view of Seki. Appellant cannot find in Finn in view of Seki, as proffered in the final Office Action, a teaching or a suggestion of a filter adjuster that adjusts an inhibiting filter where the filter includes a modeler configured to model at least one response of a feedback path when the feedback path is probed with a narrowband subaudible audio probe signal. As noted above with respect to claim 8, Finn in view of Seki does not teach or suggest a narrowband subaudible audio probe signal. Further, Finn in view of Seki does not teach or suggest a system configured to adjust an inhibiting filter using a filter adjuster based on a response of a feedback path probed with a narrowband

subaudible audio probe signal, as recited in claim 40.

Considering claim 40 as a whole and the differences between claim 8 and Finn in view of Seki, Appellant submits that Finn in view of Seki, as proffered in the Office Action, does not establish a proper *prima facie* case of obviousness with respect to claim 40, for at least the reasons discussed above. Thus, Appellant submits that claim 40 is patentable over Finn in view of Seki.

Appellant respectfully requests withdrawal of these rejections of claim 40 and allowance of this claim.

G) Discussion of the rejection of claim 1 under 35 U.S.C. § 103(a) as being unpatentable over Stott et al. (US 2002/0044667).

Appellant traverses this rejection of claim 1. Appellant respectfully asserts that the rejection, as proffered in the final Office Action, fails to that show that Stott et al. (hereafter Stott) teaches or suggests all the elements of claim 1.

Appellant cannot find in Stott a teaching or a suggestion of a narrowband probe signal. In the final Office Action on page 18, the abstract is referenced with respect to a narrowband probe signal. In the Stott Abstract, it is stated that "[t]he signal having an auto-correlation function which is substantially a delta function may be an added noise signal (70)." Appellant submits that a signal having an auto-correlation function that is a delta function does not teach or suggest that the signal itself is a delta function. According to Stott at paragraphs [0133] and [134], "[i]n order for the auto-correlation function of the signal to be as close as possible to a delta function, X(f) should be as flat as possible across the frequency spectrum." Appellant submits that to one skilled in the art, this statement from Stott demonstrates that the signal used in Stott is not narrowband, but rather is broadband.

In the Advisory Action, mailed 22 February 2007, on page 8, it is stated that that "Applicant's has not clearly define a narrowband probe signal, which the examiner can broadly interpret that limitation in any manner consistent with the limitation, such as a noise signal substantially a delta function, which reads on a narrowband probe signal." Appellant respectfully disagrees. Appellant respectfully submits that "flat as possible across the frequency spectrum" would not define the use of the term "narrowband," in the context of the written

description and customarily used by those skilled in the relevant art, as accurately reflecting both the "ordinary" and the "customary" meaning of this term. The Examiner has not provided objective evidence, a reference, or a technical reason why one skilled in the art would understand "flat as possible across the frequency spectrum" to mean narrowband. Thus, Appellant submits that analysis of Stott as stated by the Examiner in the Office Actions of record is incorrect.

Considering claim 1 as a whole and the differences between claim 1 and Stott, considering the non-narrowband signal as taught by Stott, and since noise is typically broadband, the Examiner has provided no basis for the alleged teaching of a noise signal structured substantially as a delta function. Appellant submits that the Examiner has only gleaned such teaching from the Appellant's disclosure.

Therefore, for at least the reasons discussed above, Appellant submits that Stott does not teach or suggest all the elements of claim 1 and that Stott, as proffered in the final Office Action, does not establish a proper *prima facie* case of obviousness with respect to claim 1. Thus, Appellant submits that claim 1 is patentable over Stott.

Appellant respectfully requests withdrawal of these rejections of claim 1 and allowance of this claim.

8. SUMMARY

For at least the reasons argued above, Appellant submits that claims 1-23, 25, 28-29, 34, 36, and 40 were not properly rejected. It is respectfully submitted that these claims are patentable over the cited art. Reversal of the rejections and allowance of the pending claims are respectfully requested.

Respectfully submitted,

WILLIAM S. WOODS

By his Representatives,

SCHWEGMAN, LUNDBERG, WOESSNER & KLUTH, P.A.
P.O. Box 2938
Minneapolis, MN 55402

Date 15 May 2007 By

David R. Cochran
Reg. No. 46,632

CERTIFICATE UNDER 37 CFR 1.8: The undersigned hereby certifies that this correspondence is being filed using the USPTO's electronic filing system EFS-Web, and is addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on this 15 day of May 2007.

CANDIS BUENDING

Name

Signature

CLAIMS APPENDIX

1. A method of processing audio signals, comprising:

inhibiting at least one feedback component of an input audio signal by adjusting a feedback-inhibiting filter using a narrowband subaudible probe signal.

2. A method of processing at least one audio signal, comprising:

filtering a processed signal by a notch filter to form a filtered signal; and

sending a subaudible narrowband signal having a first bandwidth into the filtered signal to form a probe signal to probe a feedback path having a second bandwidth.

3. The method of claim 2, further comprising:

comparing the probe signal to an input signal; and

adjusting selectively an inhibiting filter so as to inhibit at least one audio artifact associated with the feedback path.

4. The method of claim 3, further comprising:

turning off selectively the operation of the notch filter when the inhibiting filter is adjusted.

5. The method of claim 2, wherein sending the subaudible narrowband signal comprises sending the subaudible narrowband signal having a level, wherein the level of the subaudible narrowband signal is determined using an audibility model.

6. The method of claim 5, wherein sending the subaudible narrowband signal comprises sending the subaudible narrowband signal at a level determined by an audibility model, wherein the audibility model has a criterion level, and wherein the level of the subaudible narrowband signal is adjusted so as to be at the criterion level of the audibility model.

7. The method of claim 5, wherein sending the subaudible narrowband signal comprises

sending the subaudible narrowband signal at a level determined by an audibility model, wherein the audibility model has a criterion level, and wherein the level of the subaudible narrowband signal is adjusted so as to be below the criterion level of the audibility model.

8. A system for enhancing audio signals, the system comprising:

at least one detector to detect undesired feedback in an input signal;

at least one notch filter to filter a processed signal, wherein the at least one notch filter provides a filtered signal and the processed signal is provided by processing the input signal; and

at least one probe generator to generate a probe signal, the probe signal and the filtered signal used to probe a feedback path with a narrowband subaudible audio probe signal.

9. The system of claim 8, wherein the at least one detector determines when the feedback path will be probed.

10. The system of claim 8, wherein the at least one detector determines a range of frequencies at which the feedback path will be probed.

11. The system of claim 8, wherein the at least one detector provides a feedback parameter, and wherein the at least one notch filter is receptive to the feedback parameter from the at least one detector.

12. The system of claim 8, wherein the at least one detector provides a plurality of feedback parameters, and wherein the at least one notch filter is receptive to the plurality of feedback parameters from the at least one detector.

13. The system of claim 8, wherein the at least one notch filter has a first bandwidth, wherein the undesired feedback has a second bandwidth, and wherein the at least one notch filter is configured so as to center the first bandwidth of the at least one notch filter on the second bandwidth of the undesired feedback.

14. The system of claim 8, wherein the at least one probe generator has a first bandwidth, wherein the feedback path has a second bandwidth, and wherein the at least one probe generator is configured so as to center the first bandwidth of the at least one probe generator on the second bandwidth of the feedback path.

15. The system of claim 8, wherein the at least one probe generator generates a plurality of signals that are combined to form a probe signal to probe a feedback path.

16. The system of claim 8, further comprising a combiner to provide a combined signal, wherein the combiner combines the filtered signal of the at least one notch filter and the probe signal of the at least one probe generator.

17. The system of claim 8, further comprising a signal processor to provide the processed signal.

18. The system of claim 17, wherein the signal processor includes a compressive amplifier.

19. The system of claim 8, further comprising a switch to provide an output signal, wherein the switch is receptive to the processed signal and a combined signal, wherein the combined signal includes a combination of the probe signal and the filtered signal.

20. The system of claim 8, further comprising a filter adjuster to adjust a filter by providing a set of filter coefficients.

21. The system of claim 20, wherein the filter adjuster is configured to compare the input signal and an output signal to determine amplitude and phase responses of the feedback path, wherein the output signal includes a combination of the probe signal and the filtered signal.

22. The system of claim 20, further comprising an inhibiting filter receptive to the set of filter coefficients from the filter adjuster to inhibit at least one feedback component of the input

signal.

23. The system of claim 22, wherein the inhibiting filter approximates the response of the feedback path to provide at least one feedback component signal, wherein the at least one feedback component signal is subtracted from the input signal.

25. A system for enhancing audio signals, the system comprising:

at least one detector to detect undesired feedback in an input signal;

at least one notch filter to filter a processed signal, wherein the at least one notch filter provides a filtered signal and the processed signal is provided by processing the input signal; and

at least one probe generator to generate a probe signal, the probe signal and the filtered signal used to probe a feedback path with a narrowband subaudible audio probe signal, wherein the at least one probe generator is receptive to a feedback indicator parameter, the at least one probe generator comprising:

an amplitude indicator to indicate an amplitude level of the probe signal, wherein the amplitude indicator provides an amplitude signal;

a frequency indicator to indicate a frequency of the probe signal, wherein the frequency indicator provides a frequency signal; and

a signal generator receptive to the amplitude signal and the frequency signal to generate the probe signal.

28. The system of claim 25, wherein the signal generator is a sinusoidal generator.

29. The system of claim 25, wherein the signal generator is a narrowband noise generator.

34. The system of claim 25, wherein the frequency signal is a constant value.

36. A method of processing audio signals, comprising:

inhibiting at least one feedback component of an input audio signal by adjusting a feedback-inhibiting filter using a narrowband subaudible probe signal, wherein the method

further includes generating a probe signal to provide the narrowband subaudible probe signal, generating the probe signal including:

generating an amplitude signal that is indicative of an amplitude level of the probe signal;

generating a frequency signal that is indicative of a frequency of the probe signal; and

generating a sinusoidal signal that is based on the amplitude signal and the frequency signal.

40. The system of claim 8, further including a filter adjuster to adjust an inhibiting filter to inhibit the undesired feedback by providing a set of filter coefficients, the filter adjuster comprising:

a modeler receptive to a feedback indicator parameter, the input signal, and an output signal to model at least one response of the feedback path when the feedback path is probed with the narrowband subaudible audio probe signal at a predetermined frequency, wherein the modeler provides at least one sample that is representative of the at least one response of the feedback path.

EVIDENCE APPENDIX

None.

RELATED PROCEEDINGS APPENDIX

None.